



## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2022-0012; Project Identifier AD-2022-00057-T; Amendment 39-21922; AD 2022-03-05]**

**RIN 2120-AA64**

#### **Airworthiness Directives; The Boeing Company Airplanes**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule; request for comments.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for all The Boeing Company Model 747-8F and 747-8 series airplanes and Model 777 airplanes.

This AD was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7-3.98 GHz frequency band (5G C-Band), and a recent determination that this interference may affect multiple airplane systems using radio altimeter data, including the pitch control laws, including those that provide tail strike protection, regardless of the approach type or weather. This AD requires revising the limitations section of the existing airplane flight manual (AFM) to incorporate limitations prohibiting dispatching or releasing to airports, and approaches or landings on runways, when in the presence of 5G C-Band interference as identified by Notices to Air Missions (NOTAMs). The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The FAA must receive comments on this AD by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- Federal eRulemaking Portal: Go to <https://www.regulations.gov>. Follow the instructions for submitting comments.

- Fax: 202-493-2251.

- Mail: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

- Hand Delivery: Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

### **Examining the AD Docket**

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2022-0012; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The street address for the Docket Operations is listed above.

**FOR FURTHER INFORMATION CONTACT:** Dean Thompson, Senior Aerospace Engineer, Systems and Equipment Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3165; email: [dean.r.thompson@faa.gov](mailto:dean.r.thompson@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Background**

In March 2020, the United States Federal Communications Commission (FCC) adopted final rules authorizing flexible use of the 3.7-3.98 GHz band for next generation

services, including 5G and other advanced spectrum-based services.<sup>1</sup> Pursuant to these rules, C-Band wireless broadband deployment is permitted to occur in phases with the opportunity for operations in the lower 0.1 GHz of the band (3.7-3.8 GHz) in certain markets as early as January 19, 2022. This AD refers to “5G C-Band” interference, but wireless broadband technologies, other than 5G, may use the same frequency band.<sup>2</sup> These other uses of the same frequency band are within the scope of this AD since they would introduce the same risk of radio altimeter interference as 5G C-Band.

The radio altimeter is an important aircraft instrument, and its intended function is to provide direct height-above-terrain/water information to a variety of aircraft systems. Commercial aviation radio altimeters operate in the 4.2-4.4 GHz band, which is separated by 0.22 GHz from the C-Band telecommunication systems in the 3.7-3.98 GHz band. The radio altimeter is more precise than a barometric altimeter and for that reason is used where aircraft height over the ground needs to be precisely measured, such as autoland, manual landings, or other low altitude operations. The receiver on the radio altimeter is typically highly accurate, however it may deliver erroneous results in the presence of out-of-band radio frequency emissions from other frequency bands. The radio altimeter must detect faint signals reflected off the ground to measure altitude, in a manner similar to radar. Out-of-band signals could significantly degrade radio altimeter functions during critical phases of flight, if the altimeter is unable to sufficiently reject those signals.

The FAA issued AD 2021-23-12, Amendment 39-21810 (86 FR 69984, December 9, 2021) (AD 2021-23-12) to address the effect of 5G C-Band interference on all transport and commuter category airplanes equipped with a radio (also known as radar) altimeter. AD 2021-23-12 requires revising the limitations section of the existing

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<sup>1</sup> The FCC’s rules did not make C-Band wireless broadband available in Alaska, Hawaii, and the U.S. Territories.

<sup>2</sup> The regulatory text of the AD uses the term “5G C-Band” which, for purposes of this AD, has the same meaning as “5G”, “C-Band” and “3.7-3.98 GHz.”

AFM to incorporate limitations prohibiting certain operations, which require radio altimeter data to land in low visibility conditions, when in the presence of 5G C-Band interference as identified by NOTAM. The FAA issued AD 2021-23-12 because radio altimeter anomalies that are undetected by the automation or pilot, particularly close to the ground (e.g. landing flare), could lead to loss of continued safe flight and landing.

Since the FAA issued AD 2021-23-12, Boeing has continued to evaluate potential 5G C-band interference on aircraft systems that rely on radio altimeter inputs. As a result of this ongoing evaluation, Boeing issued Boeing Multi Operator Messages MOM-MOM-22-0024-01B(R2), dated January 18, 2022, and MOM-MOM-22-0039-01B(R1), dated January 18, 2022, for Boeing Model 777 airplanes and Model 747-8F and 747-8 series airplanes, respectively.

Based on Boeing's data, the FAA identified an additional hazard presented by 5G C-band interference on The Boeing Company Model 747-8F and 747-8 series airplanes and Model 777 airplanes. The FAA determined that anomalies due to 5G C-Band interference may affect multiple airplane systems using radio altimeter data, including the pitch control laws, including control laws that provide tail strike protection, regardless of the approach type or weather. These anomalies may not be evident until very low altitudes. Due to 5G C-Band interference, missing or erroneous radio altimeter data used by the flight control system may result in uncommanded, inappropriate pitch inputs, adversely affecting controllability. This interference could also cause multiple erroneous flight deck effects, including misleading flight director information and erroneous autothrottle behavior and Flight Mode Annunciations. These flight deck effects, when combined with the effects of the uncommanded, inappropriate pitch inputs, could affect the flightcrew's ability to accomplish continued safe flight and landing. Other systems that could be impacted by this missing or erroneous data, and contribute to this hazard, include, but are not limited to: autopilot flight director system; autothrottle system;

engines; flight controls; flight instruments; traffic alert and collision avoidance system (TCAS); ground proximity warning system (GPWS); and configuration warnings.

In sum, 5G C-Band interference, which may result in missing or erroneous radio altimeter data provided to the airplane's flight control computers where pitch control and other laws reside, in combination with multiple flight deck effects, could result in uncommanded, inappropriate pitch inputs, which are especially hazardous at low altitudes, and loss of continued safe flight and landing. This is an unsafe condition.

This AD requires revising the limitations section of the existing AFM to incorporate limitations prohibiting dispatching or releasing to airports, and approaches or landings on runways, when in the presence of 5G C-Band interference as identified by NOTAMs.

The FAA is issuing this AD to address the unsafe condition on these products.

#### **FAA's Determination**

The FAA is issuing this AD because the agency has determined the unsafe condition described previously is likely to exist or develop in other products of the same type design.

#### **AD Requirements**

This AD requires revising the limitations section of the existing AFM to incorporate limitations prohibiting dispatching or releasing to airports, and approaches or landings on runways, when in the presence of 5G C-Band interference as identified by NOTAMs.

#### **Compliance with AFM Revisions**

Section 91.9 prohibits any person from operating a civil aircraft without complying with the operating limitations specified in the AFM. FAA regulations also require operators to furnish pilots with any changes to the AFM (14 CFR 121.137) and pilots in command to be familiar with the AFM (14 CFR 91.505).

## **Interim Action**

The FAA considers this AD to be an interim action. If final action is later identified, the FAA might consider further rulemaking.

## **Justification for Immediate Adoption and Determination of the Effective Date**

Section 553(b)(3)(B) of the Administrative Procedure Act (APA) (5 U.S.C. 551 *et seq.*) authorizes agencies to dispense with notice and comment procedures for rules when the agency, for “good cause,” finds that those procedures are “impracticable, unnecessary, or contrary to the public interest.” Under this section, an agency, upon finding good cause, may issue a final rule without providing notice and seeking comment prior to issuance. Further, section 553(d) of the APA authorizes agencies to make rules effective in less than thirty days, upon a finding of good cause.

An unsafe condition exists that requires the immediate adoption of this AD without providing an opportunity for public comments prior to adoption. The FAA has found that the risk to the flying public justifies forgoing notice and comment prior to adoption of this rule because missing or erroneous radio altimeter data provided (as a result of 5G C-Band interference) to the airplane’s pitch control laws, in combination with multiple flight deck effects, could lead to uncommanded, inappropriate pitch inputs, and the loss of continued safe flight and landing. The urgency is based on the hazard presented by such pitch inputs occurring at low altitudes, and on C-Band wireless broadband deployment, which is expected to occur in phases with operations beginning as soon as January 19, 2022. Accordingly, notice and opportunity for prior public comment are impracticable and contrary to the public interest pursuant to 5 U.S.C. 553(b)(3)(B).

In addition, the FAA finds that good cause exists pursuant to 5 U.S.C. 553(d) for making this amendment effective in less than 30 days, for the same reasons the FAA found good cause to forgo notice and comment.

## **Comments Invited**

The FAA invites you to send any written data, views, or arguments about this final rule. Send your comments to an address listed under ADDRESSES. Include Docket No. FAA-2022-0012 and Project Identifier AD-2022-00057-T at the beginning of your comments. The most helpful comments reference a specific portion of the final rule, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this final rule because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to <https://www.regulations.gov>, including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this final rule.

## **Confidential Business Information**

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this AD contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this AD, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this AD. Submissions containing CBI should be sent to Dean Thompson, Senior Aerospace Engineer, Systems and Equipment Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3165; email:

dean.r.thompson@faa.gov. Any commentary that the FAA receives that is not specifically designated as CBI will be placed in the public docket for this rulemaking.

### **Regulatory Flexibility Act**

The requirements of the Regulatory Flexibility Act (RFA) do not apply when an agency finds good cause pursuant to 5 U.S.C. 553 to adopt a rule without prior notice and comment. Because the FAA has determined that it has good cause to adopt this rule without notice and comment, RFA analysis is not required.

### **Costs of Compliance**

The FAA estimates that this AD affects 336 airplanes of U.S. registry. The FAA estimates the following costs to comply with this AD:

<b>Estimated costs</b>				
<b>Action</b>	<b>Labor cost</b>	<b>Parts cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
AFM revision	1 work-hour X \$85 per hour = \$85	\$0	\$85	\$28,560

### **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.



## **Regulatory Findings**

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a “significant regulatory action” under Executive Order 12866, and
- (2) Will not affect intrastate aviation in Alaska.

## **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

## **The Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

### **PART 39 - AIRWORTHINESS DIRECTIVES**

- 1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

#### **§ 39.13 [Amended]**

- 2. The FAA amends § 39.13 by adding the following new airworthiness directive:

**2022-03-05 The Boeing Company:** Amendment 39-21922 ; Docket No. FAA-2022-0012; Project Identifier AD-2022-00057-T.

#### **(a) Effective Date**

This airworthiness directive (AD) is effective [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

#### **(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to The Boeing Company airplanes identified in paragraphs (c)(1) and (2) of this AD, certificated in any category.

(1) Model 747-8F and 747-8 series airplanes.

(2) Model 777-200, -200LR, -300, -300ER, and 777F series airplanes.

**(d) Subject**

Air Transport Association (ATA) of America Code 34, Navigation.

**(e) Unsafe Condition**

This AD was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7-3.98 GHz frequency band (5G C-Band), and a determination that this interference may affect other airplane systems using radio altimeter data, including the pitch control laws, including those that provide tail strike protection, regardless of the approach type or weather. The FAA is issuing this AD to address missing or erroneous radio altimeter data, which, in combination with multiple flight deck effects, could lead to loss of continued safe flight and landing.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) Airplane Flight Manual (AFM) Revision**

Within 2 days after the effective date of this AD: Revise the Limitations Section of the existing AFM to include the information specified in figure 1 to paragraph (g) of this AD. This may be done by inserting a copy of figure 1 to paragraph (g) of this AD into the existing AFM.

**Figure 1 to paragraph (g) – *AFM Limitations Revision***

**(Required by AD 2022-03-05)**

**Approaches and Landings in the Presence of Radio Altimeter 5G C-Band Interference**

Dispatching or releasing to airports, and approaches or landings on runways, in U.S. airspace in the presence of 5G C-Band wireless broadband interference as identified by NOTAM is prohibited (NOTAMs will be issued to state the specific airports or approaches where the radio altimeter is unreliable due to the presence of 5G C-Band wireless broadband interference).

Note 1 to paragraph (g): Additional information about the unsafe condition identified in this AD can be found in Boeing Multi Operator Messages MOM-MOM-22-0024-01B(R2), dated January 18, 2022, and MOM-MOM-22-0039-01B(R1), dated January 18, 2022, for Boeing Model 777 airplanes and Model 747-8F and 747-8 series airplanes, respectively.

**(h) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, Seattle ACO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or responsible Flight Standards Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (i)(1) of this AD. Information may be emailed to: 9-ANM-Seattle-ACO-AMOC-Requests@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the responsible Flight Standards Office.

(3) AMOCs approved for AD 2021-23-12, Amendment 39-21810 (86 FR 69984, December 9, 2021) providing relief for specific radio altimeter installations are approved as AMOCs for the provisions of this AD.

**(i) Related Information**

(1) For more information about this AD, contact Dean Thompson, Senior Aerospace Engineer, Systems and Equipment Section, FAA, Seattle ACO Branch, 2200 South 216th St., Des Moines, WA 98198; phone and fax: 206-231-3165; email: dean.r.thompson@faa.gov.

(2) For service information identified in this AD that is not incorporated by reference, contact Boeing Commercial Airplanes, Attention: Contractual & Data Services (C&DS), 2600 Westminister Blvd., MC 110-SK57, Seal Beach, CA 90740-5600; telephone 562-797-1717; Internet <https://www.myboeingfleet.com>.

**(j) Material Incorporated by Reference**

None.

Issued on January 20, 2022.

Gaetano A. Sciortino, Deputy Director for Strategic Initiatives,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

[FR Doc. 2022-01695 Filed: 1/25/2022 11:15 am; Publication Date: 1/27/2022]